



Analytical Laboratory

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13339 Hagers Ferry Road
Huntersville, NC 28078-7929
McGuire Nuclear Complex - MG03A2
Phone: 980-875-5245 Fax: 980-875-4349

Order Summary Report

Order Number: J12030359

Project Name: WWTS - Biweekly

Customer Name(s): Bill Kennedy, Melonie Martin, Wayne Chapman, Tom Johnson

Customer Address: 3195 Pine Hall Rd
Mailcode: Belews Steam Station
Belews Creek, NC 28012

Lab Contact: Jason C Perkins Phone: 980-875-5348

Report Authorized By: _____ **Date:** 4/12/2012
(Signature)

Program Comments:

Please contact the Program Manager (Jason C Perkins) with any questions regarding this report.

Data Flags & Calculations:

Any analytical tests or individual analytes within a test flagged with a Qualifier indicate a deviation from the method quality system or quality control requirement. The qualifier description is found at the end of the Certificate of Analysis (sample results) under the qualifiers heading. All results are reported on a dry weight basis unless otherwise noted.

Data Package:

This data package includes analytical results that are applicable only to the samples described in this narrative. An estimation of the uncertainty of measurement for the results in the report is available upon request. This report shall not be reproduced, except in full, without the written consent of the Analytical Laboratory. Please contact the Analytical laboratory with any questions. The order of individual sections within this report is as follows:

Job Summary Report, Sample Identification, Technical Validation of Data Package, Analytical Laboratory Certificate of Analysis, Analytical Laboratory QC Reports, Sub-contracted Laboratory Results, Customer Specific Data Sheets, Reports & Documentation, Customer Database Entries, Test Case Narratives, Chain of Custody (COC)

Certification:

The Analytical Laboratory holds the following State Certifications : North Carolina (DENR) Certificate #248, South Carolina (DHEC) Laboratory ID # 99005. Contact the Analytical Laboratory for definitive information about the certification status of specific methods.

Sample ID's & Descriptions:

Sample ID	Plant/Station	Collection Date and Time	Collected By	Sample Description
2012006863	BELEWS	28-Mar-12 8:00 AM	Tim Owens	FGD Purge Eff
2012006864	BELEWS	28-Mar-12 8:00 AM	Tim Owens	EQ TANK EFF.
2012006865	BELEWS	28-Mar-12 8:00 AM	Tim Owens	BIOREACTOR 1 INF.
2012006866	BELEWS	28-Mar-12 8:00 AM	Tim Owens	BIOREACTOR 2 INF.
2012006867	BELEWS	28-Mar-12 8:00 AM	Tim Owens	BIOREACTOR 2 EFF.
2012006868	BELEWS	22-Mar-12 10:15 AM	CPK	FILTER BLANK
2012006869	BELEWS	22-Mar-12 10:15 AM	CPK	Trip Blank
7 Total Samples				

Technical Validation Review

Checklist:

COC and .pdf report are in agreement with sample totals and analyses (compliance programs and procedures).

☒ Yes

☐ No

All Results are less than the laboratory reporting limits.

☐ Yes

☒ No

All laboratory QA/QC requirements are acceptable.

☒ Yes

☐ No

The Vendor Laboratories have been qualified by the Analytical Laboratory

Yes

Report Sections Included:

☒ Job Summary Report

☒ Sample Identification

☒ Technical Validation of Data Package

☒ Analytical Laboratory Certificate of Analysis

☐ Analytical Laboratory QC Report

☒ Sub-contracted Laboratory Results

☐ Customer Specific Data Sheets, Reports, & Documentation

☐ Customer Database Entries

☒ Chain of Custody

☒ Electronic Data Deliverable (EDD) Sent Separately

Reviewed By: DataBase Administrator

Date: 4/12/2012

Certificate of Laboratory Analysis

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Order # J12030359

Site: FGD Purge Eff

Collection Date: 28-Mar-12 8:00 AM

Sample #: 2012006863

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>INORGANIC IONS BY IC</u>								
Bromide	220	mg/L		5	50	EPA 300.0	02-Apr-12 21:28	JAHERMA
<u>MERCURY (COLD VAPOR) IN WATER</u>								
Mercury (Hg)	193	ug/L		5	100	EPA 245.1	05-Apr-12 13:19	AGIBBS
<u>TOTAL RECOVERABLE METALS BY ICP</u>								
Boron (B)	202	mg/L		0.5	10	EPA 200.7	10-Apr-12 12:42	DJSULL1
Manganese (Mn)	7.43	mg/L		0.05	10	EPA 200.7	10-Apr-12 12:42	DJSULL1
<u>DISSOLVED METALS BY ICP-MS</u>								
Manganese (Mn)	6550	ug/L		10	10	EPA 200.8	10-Apr-12 02:13	KRICHAR
Selenium (Se)	315	ug/L		10	10	EPA 200.8	10-Apr-12 02:13	KRICHAR
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>								
Arsenic (As)	170	ug/L		10	10	EPA 200.8	05-Apr-12 22:28	KRICHAR
Chromium (Cr)	312	ug/L		10	10	EPA 200.8	05-Apr-12 22:28	KRICHAR
Copper (Cu)	119	ug/L		10	10	EPA 200.8	05-Apr-12 22:28	KRICHAR
Nickel (Ni)	549	ug/L		10	10	EPA 200.8	05-Apr-12 22:28	KRICHAR
Selenium (Se)	4390	ug/L		10	10	EPA 200.8	05-Apr-12 22:28	KRICHAR
Silver (Ag)	17.9	ug/L		10	10	EPA 200.8	05-Apr-12 22:28	KRICHAR
Zinc (Zn)	243	ug/L		10	10	EPA 200.8	05-Apr-12 22:28	KRICHAR
<u>SELENIUM SPECIATION</u>								
Vendor Parameter	Complete				1	V_AS&C		
<u>TOTAL DISSOLVED SOLIDS</u>								
Vendor Parameter	Complete				1	V_PACE		

Site: EQ TANK EFF.

Collection Date: 28-Mar-12 8:00 AM

Sample #: 2012006864

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>MERCURY (COLD VAPOR) IN WATER</u>								
Mercury (Hg)	122	ug/L		2.5	50	EPA 245.1	05-Apr-12 13:21	AGIBBS
<u>TOTAL RECOVERABLE METALS BY ICP</u>								
Boron (B)	178	mg/L		0.5	10	EPA 200.7	10-Apr-12 12:46	DJSULL1
Manganese (Mn)	6.02	mg/L		0.05	10	EPA 200.7	10-Apr-12 12:46	DJSULL1

Certificate of Laboratory Analysis

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*This report shall not be reproduced, except in full.***Order # J12030359**

Site: EQ TANK EFF.

Collection Date: 28-Mar-12 8:00 AM

Sample #: 2012006864

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>DISSOLVED METALS BY ICP-MS</u>								
Manganese (Mn)	5560	ug/L		10	10	EPA 200.8	10-Apr-12 02:17	KRICHAR
Selenium (Se)	211	ug/L		10	10	EPA 200.8	10-Apr-12 02:17	KRICHAR
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>								
Arsenic (As)	117	ug/L		10	10	EPA 200.8	05-Apr-12 22:31	KRICHAR
Chromium (Cr)	231	ug/L		10	10	EPA 200.8	05-Apr-12 22:31	KRICHAR
Copper (Cu)	87.8	ug/L		10	10	EPA 200.8	05-Apr-12 22:31	KRICHAR
Nickel (Ni)	438	ug/L		10	10	EPA 200.8	05-Apr-12 22:31	KRICHAR
Selenium (Se)	3080	ug/L		10	10	EPA 200.8	05-Apr-12 22:31	KRICHAR
Silver (Ag)	< 10	ug/L		10	10	EPA 200.8	05-Apr-12 22:31	KRICHAR
Zinc (Zn)	181	ug/L		10	10	EPA 200.8	05-Apr-12 22:31	KRICHAR

Site: BIOREACTOR 1 INF.

Collection Date: 28-Mar-12 8:00 AM

Sample #: 2012006865

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>INORGANIC IONS BY IC</u>								
Bromide	180	mg/L		5	50	EPA 300.0	02-Apr-12 21:46	JAHERMA
<u>TOTAL RECOVERABLE METALS BY ICP</u>								
Boron (B)	155	mg/L		0.5	10	EPA 200.7	10-Apr-12 12:19	DJSULL1
Manganese (Mn)	1.15	mg/L		0.05	10	EPA 200.7	10-Apr-12 12:19	DJSULL1
<u>DISSOLVED METALS BY ICP-MS</u>								
Manganese (Mn)	1050	ug/L		10	10	EPA 200.8	10-Apr-12 02:21	KRICHAR
Selenium (Se)	126	ug/L		10	10	EPA 200.8	10-Apr-12 02:21	KRICHAR
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>								
Arsenic (As)	< 10	ug/L		10	10	EPA 200.8	05-Apr-12 22:34	KRICHAR
Chromium (Cr)	< 10	ug/L		10	10	EPA 200.8	05-Apr-12 22:34	KRICHAR
Copper (Cu)	< 10	ug/L		10	10	EPA 200.8	05-Apr-12 22:34	KRICHAR
Nickel (Ni)	63.6	ug/L		10	10	EPA 200.8	05-Apr-12 22:34	KRICHAR
Selenium (Se)	135	ug/L		10	10	EPA 200.8	05-Apr-12 22:34	KRICHAR
Silver (Ag)	< 10	ug/L		10	10	EPA 200.8	05-Apr-12 22:34	KRICHAR
Zinc (Zn)	< 10	ug/L		10	10	EPA 200.8	05-Apr-12 22:34	KRICHAR
<u>SELENIUM SPECIATION</u>								
Vendor Parameter	Complete				1	V_AS&C		

Certificate of Laboratory Analysis

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*This report shall not be reproduced, except in full.***Order # J12030359**

Site: BIOREACTOR 2 INF.

Collection Date: 28-Mar-12 8:00 AM

Sample #: 2012006866

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>TOTAL RECOVERABLE METALS BY ICP</u>								
Boron (B)	147	mg/L		0.5	10	EPA 200.7	10-Apr-12 12:22	DJSULL1
Manganese (Mn)	0.646	mg/L		0.05	10	EPA 200.7	10-Apr-12 12:22	DJSULL1
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>								
Arsenic (As)	< 10	ug/L		10	10	EPA 200.8	05-Apr-12 22:37	KRICHAR
Chromium (Cr)	< 10	ug/L		10	10	EPA 200.8	05-Apr-12 22:37	KRICHAR
Copper (Cu)	< 10	ug/L		10	10	EPA 200.8	05-Apr-12 22:37	KRICHAR
Nickel (Ni)	< 10	ug/L		10	10	EPA 200.8	05-Apr-12 22:37	KRICHAR
Selenium (Se)	< 10	ug/L		10	10	EPA 200.8	05-Apr-12 22:37	KRICHAR
Silver (Ag)	< 10	ug/L		10	10	EPA 200.8	05-Apr-12 22:37	KRICHAR
Zinc (Zn)	< 10	ug/L		10	10	EPA 200.8	05-Apr-12 22:37	KRICHAR

Site: BIOREACTOR 2 EFF.

Collection Date: 28-Mar-12 8:00 AM

Sample #: 2012006867

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>INORGANIC IONS BY IC</u>								
Bromide	150	mg/L		5	50	EPA 300.0	02-Apr-12 22:04	JAHERMA
<u>MERCURY (COLD VAPOR) IN WATER</u>								
Mercury (Hg)	< 1	ug/L		1	20	EPA 245.1	05-Apr-12 13:24	AGIBBS
<u>TOTAL RECOVERABLE METALS BY ICP</u>								
Boron (B)	152	mg/L		0.5	10	EPA 200.7	10-Apr-12 12:26	DJSULL1
Manganese (Mn)	0.530	mg/L		0.05	10	EPA 200.7	10-Apr-12 12:26	DJSULL1
<u>DISSOLVED METALS BY ICP-MS</u>								
Manganese (Mn)	544	ug/L		5	5	EPA 200.8	10-Apr-12 02:25	KRICHAR
Selenium (Se)	6.41	ug/L		5	5	EPA 200.8	10-Apr-12 02:25	KRICHAR
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>								
Arsenic (As)	< 5	ug/L		5	5	EPA 200.8	05-Apr-12 22:40	KRICHAR
Chromium (Cr)	< 5	ug/L		5	5	EPA 200.8	05-Apr-12 22:40	KRICHAR
Copper (Cu)	< 5	ug/L		5	5	EPA 200.8	05-Apr-12 22:40	KRICHAR
Nickel (Ni)	< 5	ug/L		5	5	EPA 200.8	05-Apr-12 22:40	KRICHAR
Selenium (Se)	< 5	ug/L		5	5	EPA 200.8	05-Apr-12 22:40	KRICHAR
Silver (Ag)	< 5	ug/L		5	5	EPA 200.8	05-Apr-12 22:40	KRICHAR
Zinc (Zn)	< 5	ug/L		5	5	EPA 200.8	05-Apr-12 22:40	KRICHAR
<u>SELENIUM SPECIATION</u>								
Vendor Parameter	Complete				1	V_AS&C		

Certificate of Laboratory Analysis

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Site: FILTER BLANK

Collection Date: 22-Mar-12 10:15 AM

Sample #: 2012006868

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>DISSOLVED METALS BY ICP-MS</u>								
Manganese (Mn)	3.85	ug/L		1	1	EPA 200.8	10-Apr-12 01:57	KRICHR
Selenium (Se)	1.06	ug/L		1	1	EPA 200.8	10-Apr-12 01:57	KRICHR

Site: Trip Blank

Collection Date: 22-Mar-12 10:15 AM

Sample #: 2012006869

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>TOTAL RECOVERABLE METALS BY ICP</u>								
Boron (B)	< 0.05	mg/L		0.05	1	EPA 200.7	10-Apr-12 12:15	DJSULL1
Manganese (Mn)	< 0.005	mg/L		0.005	1	EPA 200.7	10-Apr-12 12:15	DJSULL1

TOTAL RECOVERABLE METALS BY ICP-MS

Arsenic (As)	< 1	ug/L		1	1	EPA 200.8	05-Apr-12 22:25	KRICHR
Chromium (Cr)	< 1	ug/L		1	1	EPA 200.8	05-Apr-12 22:25	KRICHR
Copper (Cu)	< 1	ug/L		1	1	EPA 200.8	05-Apr-12 22:25	KRICHR
Nickel (Ni)	< 1	ug/L		1	1	EPA 200.8	05-Apr-12 22:25	KRICHR
Selenium (Se)	< 1	ug/L		1	1	EPA 200.8	05-Apr-12 22:25	KRICHR
Silver (Ag)	1.43	ug/L		1	1	EPA 200.8	05-Apr-12 22:25	KRICHR
Zinc (Zn)	< 1	ug/L		1	1	EPA 200.8	05-Apr-12 22:25	KRICHR

SELENIUM SPECIATION

Vendor Parameter	Complete				1	V_AS&C		
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April 04, 2012

Terry Whitner
Duke Energy Carolinas, LLC
PO Box 37929
DPEHS
Charlotte, NC 28237

RE: Project: J12030359
Pace Project No.: 92115350

Dear Terry Whitner:

Enclosed are the analytical results for sample(s) received by the laboratory on March 29, 2012. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

Analyses were performed at the Pace Analytical Services location indicated on the sample analyte page for analysis unless otherwise footnoted.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Kevin Herring

kevin.herring@pacelabs.com
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

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(828)254-7176

Pace Analytical Services, Inc.
9800 Rife Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

CERTIFICATIONS

Project: J12030359
Pace Project No.: 92115350

Asheville Certification IDs

2225 Riverside Dr., Asheville, NC 28804
Florida/NELAP Certification #: E87648
Massachusetts Certification #: M-NC030
North Carolina Drinking Water Certification #: 37712
North Carolina Wastewater Certification #: 40

South Carolina Certification #: 99030001
Virginia Certification #: 00072
West Virginia Certification #: 356
Virginia/VELAP Certification #: 460147

REPORT OF LABORATORY ANALYSIS

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Asheville, NC 28804
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3006 Kinross Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

SAMPLE ANALYTE COUNT

Project: J12030359
Pace Project No.: 92115350

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
92115350001	2012006863	SM 2540C	LMD	1	PASI-A

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: J12030359

Pace Project No.: 92115350

Sample: 2012006863		Lab ID: 92115350001	Collected: 03/28/12 08:00	Received: 03/29/12 15:10	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
2540C Total Dissolved Solids		Analytical Method: SM 2540C						
Total Dissolved Solids	20300	mg/L	500	1		04/02/12 15:11		

QUALITY CONTROL DATA

Project: J12030359

Pace Project No.: 92115350

QC Batch: WET/20301

Analysis Method: SM 2540C

QC Batch Method: SM 2540C

Analysis Description: 2540C Total Dissolved Solids

Associated Lab Samples: 92115350001

METHOD BLANK: 744524

Matrix: Water

Associated Lab Samples: 92115350001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	ND	25.0	04/02/12 15:01	

LABORATORY CONTROL SAMPLE: 744525

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	250	226	90	80-120	

SAMPLE DUPLICATE: 744526

Parameter	Units	92115151012 Result	Dup Result	RPD	Qualifiers
Total Dissolved Solids	mg/L	61.0	49.0	22	D6

SAMPLE DUPLICATE: 744527

Parameter	Units	92115267003 Result	Dup Result	RPD	Qualifiers
Total Dissolved Solids	mg/L	4600	6280	31	D6

QUALIFIERS

Project: J12030359
Pace Project No.: 92115350

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Acid preservation may not be appropriate for 2-Chloroethylvinyl ether, Styrene, and Vinyl chloride.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-A Pace Analytical Services - Asheville

ANALYTE QUALIFIERS

D6 The relative percent difference (RPD) between the sample and sample duplicate exceeded laboratory control limits.

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: J12030359

Pace Project No.: 92115350

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
92115350001	2012006863	SM 2540C	WET/20301		



**APPLIED SPECIATION
AND CONSULTING, LLC**

18804 Northcreek Parkway Bothell, WA, 98011
Tel: (425) 483-3300 Fax: (425) 483-9818
www.appliedspeciation.com

April 3, 2012

Jay Perkins
Duke Energy Analytical Laboratory
Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd.
Huntersville, NC 28078
(704) 875-5245

Project: Belews – FGD WWTS (Bi-Monthly-Wed-Sampling) (LIMS # J12030359)

Dear Mr. Perkins,

Attached is the report associated with four (4) aqueous samples submitted for selenium speciation analysis on March 29, 2012. The samples were received in a sealed cooler at -0.3°C on March 30, 2012. Selenium speciation analysis was performed via ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS). Any issues associated with the analysis are addressed in the following report.

If you have any questions, please feel free to contact me at your convenience.

Sincerely,

A handwritten signature in black ink, appearing to read "Russell Gerads".

Russell Gerads
Vice President
Applied Speciation and Consulting, LLC

Applied Speciation and Consulting, LLC

Report prepared for:

Jay Perkins
Duke Energy Analytical Laboratory
Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd.
Huntersville, NC 28078

Project: Belews – FGD WWTS (Bi-Monthly-Wed-Sampling) (LIMS # J12030359)

April 3, 2012

1. Sample Reception

Four (4) aqueous samples in 125mL HDPE bottles (provided by Applied Speciation and Consulting) were submitted for selenium speciation analysis on March 29, 2012. The samples were received on March 30, 2012 in a sealed container at -0.3°C.

The samples were received in a laminar flow clean hood, void of trace metals contamination and ultra-violet radiation, and was designated a discrete sample identifier. An aliquot of each sample was filtered (0.45µm) and each filtrate was stored in a secure, monitored cryofreezer (maintained at a temperature of -80°C) until selenium speciation analysis could be performed via ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS).

2. Sample Preparation

All sample preparation is performed in laminar flow clean hoods known to be free from trace metals contamination. All applied water for dilutions and sample preservatives are monitored for contamination to account for any biases associated with the sample results.

Selenium Speciation Analysis by IC-ICP-DRC-MS Prior to analysis, an aliquot of each sample was filtered with a syringe filter (0.45µm) and injected directly into a sealed autosampler vial. No further sample preparation was performed as any chemical alteration of a sample may shift the equilibrium of the system, resulting in changes in speciation ratios.

3. Sample Analysis

All sample analysis is preceded by a minimum of a five-point calibration curve spanning the entire concentration range of interest. Calibration curves are performed at the beginning of each analytical day. All calibration curves, associated with each species of interest, are

standardized by linear regression resulting in a response factor. All sample results are **instrument blank corrected** to account for any operational biases associated with the analytical platform.

Prior to sample analysis, all calibration curves are verified using second source standards which are identified as initial calibration verification standards (ICV).

Ongoing instrument performance is identified by the analysis of continuing calibration verification standards (CCV) and continuing calibration blanks (CCB) at a minimal interval of every ten analytical runs.

Selenium Speciation Analysis by IC-ICP-DRC-MS Each sample for selenium speciation analysis was analyzed by ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS) on March 30, 2012. An aliquot of each sample is injected onto an anion exchange column and mobilized by a basic ($\text{pH} > 7$) gradient. The eluting selenium species are then introduced into a radio frequency (RF) plasma where energy-transfer processes cause desolvation, atomization, and ionization. The ions are extracted from the plasma through a differentially-pumped vacuum interface and travel through a pressurized chamber (DRC) containing a reaction gas which preferentially reacts with interfering ions of the same target mass to charge ratios (m/z). A solid-state detector detects ions transmitted through the mass analyzer and the resulting current is processed by a data handling system.

Retention times for each eluting species are compared to known standards for species identification.

4. Analytical Issues

The overall analyses went well and no significant analytical issues were encountered. All quality control parameters associated with this sample were within acceptance limits.

The estimated method detection limits (eMDLs) for selenite, selenate, and selenocyanate are generated from replicate analyses of the lowest standard in the calibration curve. Not all selenium species are present in preparation blanks; therefore, eMDL calculations based on preparation blanks are artificially biased low.

The eMDL for methylseleninic acid and selenomethionine is calculated from the average eMDL of selenite, selenate, and selenocyanate. The calibration does not contain methylseleninic acid or selenomethionine due to impurities in these standards which would bias the results for other selenium species.

If you have any questions or concerns regarding this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read 'Russell Gerads', with a stylized, flowing script.

Russell Gerads
Vice President
Applied Speciation and Consulting, LLC

Selenium Speciation Results for Duke Energy
 Project Name: Belews - FGD WWTS (Bi-Monthly-Wed-Sampling)
 Contact: Jay Perkins
 LIMS #J12030359

Date: April 3, 2012
 Report Generated by: Russell Gerads
 Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Se(IV)	Se(VI)	SeCN	MeSe(IV)	SeMe	Unknown Se Species (n)
FGD Purge Eff	219	98.7	ND (<1.8)	2.6	ND (<1.9)	0 (0)
BioReactor 1 Inf	28.8	96.4	ND (<0.45)	2.62	ND (<0.47)	0 (0)
BioReactor 2 Eff	ND (<0.59)	ND (<0.36)	ND (<0.45)	ND (<0.47)	ND (<0.47)	0 (0)
Metals Trip Blk	ND (<0.12)	ND (<0.071)	ND (<0.089)	ND (<0.093)	ND (<0.093)	0 (0)

All results reflect the applied dilution and are reported in µg/L

ND = Not detected at the applied dilution

SeCN = Selenocyanate

MeSe(IV) = Methylseleninic acid

SeMe = Selenomethionine

Unknown Se Species = Total concentration of all unknown Se species observed by IC-ICP-MS

n = number of unknown Se species observed

Selenium Speciation Results for Duke Energy
 Project Name: Belews - FGD WWTS (Bi-Monthly-Wed-Sampling)
 Contact: Jay Perkins
 LIMS #J12030359

Date: April 3, 2012
 Report Generated by: Russell Gerads
 Applied Speciation and Consulting, LLC

Quality Control Summary - Preparation Blank Summary

Analyte (µg/L)	PBW1	PBW2	PBW3	PBW4	Mean	StdDev	eMDL*	eMDL 10x	eMDL 50x	eMDL 200x
Se(IV)	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.12	0.59	2.4
Se(VI)	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.071	0.36	1.4
SeCN	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.089	0.45	1.8
MeSe(IV)	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.093	0.47	1.9
SeMe	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.093	0.47	1.9

eMDL = Estimated Method Detection Limit

*Please see narrative regarding eMDL calculations

Quality Control Summary - Certified Reference Materials

Analyte (µg/L)	CRM	True Value	Result	Recovery
Se(IV)	LCS	9.57	9.07	94.8
Se(VI)	LCS	9.48	9.03	95.3
SeCN	LCS	8.92	8.28	92.8
MeSe(IV)	LCS	6.47	5.92	91.5
SeMe	LCS	9.32	8.49	91.0

Selenium Speciation Results for Duke Energy
 Project Name: Belews - FGD WWTS (Bi-Monthly-Wed-Sampling)
 Contact: Jay Perkins
 LIMS #J12030359

Date: April 3, 2012
 Report Generated by: Russell Gerads
 Applied Speciation and Consulting, LLC

Quality Control Summary - Matrix Duplicates

Analyte (µg/L)	Sample ID	Rep 1	Rep 2	Mean	RPD
Se(IV)	Batch QC	ND (<2.4)	ND (<2.4)	NC	NC
Se(VI)	Batch QC	ND (<1.4)	ND (<1.4)	NC	NC
SeCN	Batch QC	4.6	4.1	4.3	11.1
MeSe(IV)	Batch QC	ND (<1.9)	ND (<1.9)	NC	NC
SeMe	Batch QC	ND (<1.9)	ND (<1.9)	NC	NC

ND = Not detected at the applied dilution

NC = Value was not calculated due to one or more concentrations below the eMDL

Quality Control Summary - Matrix Spike/ Matrix Spike Duplicate

Analyte (µg/L)	Sample ID	Spike Conc	MS Result	Recovery	Spike Conc	MSD Result	Recovery	RPD
Se(IV)	Batch QC	1112	1339	120.4	1112	1331	119.7	0.6
Se(VI)	Batch QC	1009	1175	116.4	1009	1147	113.7	2.4
SeCN	Batch QC	915.0	1000	108.8	915.0	960.7	104.5	4.0



CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM

Analytical Laboratory Use Only

Order# 12030359 Matrix: OTHER

Duke Energy Analytical Laboratory
Mail Code MG03A2 (Building 7405)
13339 Hagers Ferry Rd
Huntersville, N.C. 28078
(704) 875-5245
Fax: (704) 875-4349

Page 1 of 2
DISTRIBUTION
ORIGINAL TO LAB,
COPY TO CLIENT

1) Project Name	Bellevue - FGD		2) Phone No:
3) Client:	WWTS (Bi-Monthly-Wed-Sampling) Bill Kennedy, Melonie Martin, Wayne Chapman, Tom Johnson **		4) Fax No:
5) Business Unit:	6) Process:	Mail Code:	
8) Oper. Unit:	9) Rec. Type:	10) Reso. Center:	

Vendor:	Page, ASVC	Customer (Name & Address):	2-H ₂ SO ₄ , 3-HNO ₃
Logged By:	optb	Date & Time:	3-29-12 11:21
Vendor:	Page, ASVC	Collector (Name & Address):	2-H ₂ SO ₄ , 3-HNO ₃
Logged By:	optb	Date & Time:	3-29-12 11:21
Vendor:	Page, ASVC	Collector (Name & Address):	2-H ₂ SO ₄ , 3-HNO ₃
Logged By:	optb	Date & Time:	3-29-12 11:21

Customer to complete all appropriate non-shaded areas.

16 Analyses Required

TDS - Page
Hg - 245.1
Br (IC)
Metals*
Mn, Se, soluble

Se, speciation - vendor to AS&C (Important to place filled bottle back into both baggies)

Sampling conducted: 2nd and 4th Wednesday

Se Speciation Bottle ID	13 Sample Description or ID	Date	Time	Signature	17 Comp.	18 Grab	TDS	Hg	Br	Metals	Mn, Se, soluble	Se, speciation
11 Lab ID	FGD Purge Eff	3/28	0800	Tim Powers	1	1	1	1	1	1	1	1
	EQ Tank Eff.	3/28			1	1	1	1	1	1	1	1
	BioReactor 1 Inf	3/28			1	1	1	1	1	1	1	1
	BioReactor 2 Inf	3/28			1	1	1	1	1	1	1	1
	BioReactor 2 Eff	3/28			1	1	1	1	1	1	1	1
	Filter Bk	3-22	1015	optb	1	1	1	1	1	1	1	1
	Metals Trip Bk	3-22		optb	1	1	1	1	1	1	1	1

Filtering of Se is performed in the field...

1) Relinquished By	Date/Time	2) Accepted By	Date/Time
3) Relinquished By	Date/Time	4) Accepted By	Date/Time
5) Relinquished By	Date/Time	6) Accepted By	Date/Time
7) Relinquished By	Date/Time	8) Accepted By	Date/Time
9) Seal/Label Opened By	Date/Time	10) Seal/Label Opened By	Date/Time
11) Seal/Label Opened By	Date/Time	12) Seal/Label Opened By	Date/Time

Customer, IMPORTANT!
Please indicate desired turnaround.

22 Requested Turnaround

14 Days _____

7 Days _____

48 Hr _____

Other _____

*Add Cost Will Apply

4-5-12

not coded

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM



Duke Energy Analytical Laboratory
Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd
Huntersville, N. C. 28078
(704) 875-5245
Fax: (704) 875-4349

Analytical Laboratory Use Only			
Order # 512030351	Matrix: OTHER	Samples Originating From NC SC	
Logged By cpk	Date & Time 3-29-12 1121	SAMPLE PROGRAM Water Ground Drinking Water UST RCRA Waste	
Vendor Pace, ASVC	Cooler Temp (C) <1		
Vendor:	Preserv.: 1=HCL 2=H ₂ SO ₄ 3=HNO ₃ 4=Ice 5=None		

19 Page 1 of 2
Page 23 of 23
DISTRIBUTION
ORIGINAL to LAB,
COPY to CLIENT

1) Project Name Belews - FGD WWTS (Bi-Monthly-Wed-Sampling)	2) Phone No:
2) Client: Bill Kennedy, Melonie Martin, Wayne Chapman, Tom Johnson **	4) Fax No:
5) Business Unit:	6) Process: Mail Code:
8) Oper. Unit:	10) Reso. Center:

LAB USE ONLY

11 Lab ID
2012006863

64
65
66
67
68
69

Customer to complete appropriate columns to right

Se Speciation Bottle ID	13 Sample Description or ID	Date	Time	Signature	17 Comp.	18 Grab	TDS	Hg - 245.1	Br (IC)	Metals*	Mn, Se, soluble	Se, speciation - vendor to AS&C (important to place filled bottle back into both baggies)	Post Codes
	FGD Purge Eff	3/28	0800	Tim Owens			1	1	1	1	1	1	7
	EQ Tank Eff.	3/28						1		1	1		4
	BioReactor 1 Inf	3/28							1	1	1	1	5
	BioReactor 2 Inf	3/28								1			2
	BioReactor 2 Eff	3/28						1	1	1	1	1	6
	Filter Blk	3-22	1015	cpk							1		1
	Metals Trip Blk	3-22		cpk			1	1		1		1	3
Filtering of Se is performed in the field...													

Customer to sign & date below - fill out from left to right.

1) Relinquished By [Signature]	Date/Time 3-29-12 1340	2) Accepted By cpk	Date/Time 3-29-12
3) Relinquished By [Signature]	Date/Time 3-29-12 1340	4) Accepted By [Signature]	Date/Time 3-29-12 1340
5) Relinquished By	Date/Time	6) Accepted By	Date/Time
7) Relinquished By cpk	Date/Time 3-29-12	8) Accepted By	Date/Time
9) Seal/Locked By cpk	Date/Time 3-29-12	10) Seal/Locked By	Date/Time
11) Seal/Locked By	Date/Time	12) Seal/Locked By	Date/Time
Comments * Metals=TRM/ICP= B, Mn TRM/IMS=As, Ag, Cr, Cu, Ni, Se, Zn thomas.d.johnson@siemens.com			

Customer, IMPORTANT!
Please indicate desired turnaround.

22 Requested Turnaround

14 Days _____

*7 Days _____

*48 Hr _____

*Other _____

* Add. Cost Will Apply

4-5-12